not diminish, it would become more fitful, and the country more and more exposed to extremes of temperature, our winds drier, and our soil more arid and sterile. For conserving our allotted rainfall, tempering and moistening the burning equatorial winds, for moderating the sun's powerful rays, and the rapid terrestrial radiation, which produces such low temperatures at night, and for checking rapid evaporation, our forest lands are the chief agents. Denude our timbered ranges, clear away our lower forests, and our climate will soon become like those of some of the similar latitudes in the northern hemisphere already referred to, where no middle state is known between a scorching arid summer and an intensely cold and equally arid winter, tempered only by occasional heavy rains of short duration.

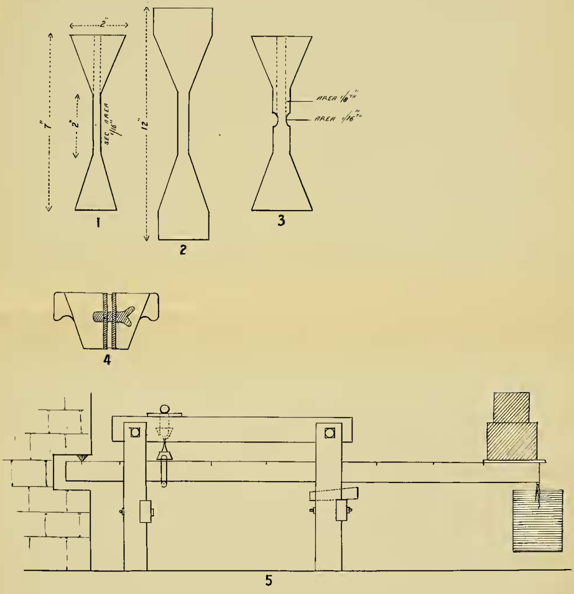
Moderate forest clearing in very humid climates is doubtless beneficial, and many tropical regions have been rendered habitable and healthy by the process; but in a dry climate like that of Southern Australia, the indiscriminate clearing of timbered lands invites an ever-increasing aridity of climate and diminishing fertility of the soil.

Art. II.—*Experiments on the Tensile Strength of a few of the Colonial Timbers.*

By Fred. A. Campbell, C.E.

[Communicated May 8th, 1879.]

These experiments were made at Geelong during a short period of leisure time. As the power I could bring to bear upon the specimens did not exceed a ton, I found it necessary to work upon specimens with a sectional area of one-sixteenth of an inch. The form of specimen first adopted was that shown in figure 1, but as with the stronger woods the specimens gave way by the detrusion of a piece from the centre, as shown by dotted lines, I adopted a form, as in figure 2, five inches longer. The apparatus used was of the


2"
7"
2"
SEC AREA 1/16"
12"
AREA 1/8TH"
AREA 1/16TH"
1
2
3
4
5

roughest description, but it answered its purpose. The specimens were held at each end by wrought-iron clips, as shown in figure 4, and then hung and pulled by means of a lever, as shown in figure 5. Using known weights and sliding them along the lever, which was graduated, I readily obtained the breaking weight of the specimen. The weights were always applied in such a way as to cause a gradually increasing stress upon the specimen, perhaps fifteen to twenty minutes being taken to work up to the breaking weight.

The wood was well seasoned, and probably better on the whole than the average used for engineering and building purposes.

With the exception of the blackwood and deal, all the specimens of the same kind of wood were taken from one piece.

With these facts, and the numerical result of each experiment, the true value may be placed by anyone upon what has been done.

Of course, the numerical value of the tensile strength of any timber is a quantity which varies greatly, being affected by age, seasoning, defects, part of tree from which the specimen is cut, &c., and the limits within which it varies can only be fixed after numerous experiments made under different circumstances.

Now, the experiments noted hereafter give the values of tensile strength under certain stated conditions, and will, therefore, I hope, though in themselves not of great importance, assist in determining at some future time the average value for good qualities of some of our colonial timbers.

They do also, I think, throw some light which may be interesting, upon the ratio which exists between the strengths of the different kinds—the value, for instance, for white and blue gum being three and a half times that for messmate. An examination of the fractured specimens shows the character of the fibre, and indicates clearly that the tensile strength is highest where the fibre is straightest.

RESULTS OF EXPERIMENTS.

I. Messmate. *Eucalyptus obliqua.* Bullarook Forest.

	Lbs. per sq. in.		
a.	8500.	Broken.	Rather short fracture.
b.	8500.	Broken.	Short fracture.
c.	8200.	Broken.	Short fracture.

The wood was well seasoned, clean, but not quite free from shakes. This defect should not, however, affect its tensile strength to any appreciable extent.

II. Bluegum. *Eucalyptus globulus.* Tasmania.

	Lbs. per sq. in.	
a.	26,500.	Pulled through entirely.
b.	24,000.	Cracked, but not broken. The lever at 24,000 lbs. reached its limit.
c.	29,800.	Broken. Very long fracture.
d.	26,700.	Pulled through. This specimen was 12 in. long.

A very good, well-seasoned specimen of this wood, beautifully clean and straight in grain.

Lancewood, tensile strength	23,400
Beech	22,000

These are the highest values in the tables of Rankine and Molesworth.

III. Whitegum. *Eucalyptus.* Bullarook Forest.

	Lbs. per in.	
a.	29,700.	Entirely pulled through.
b.	28,900.	Broken. Very long fracture.
c.	25,000.	Broken. Long fracture. This last was not a fair test, as the specimen was not hung perfectly straight, and so cracked on one side before giving way.

This was a very fine, clean, well-seasoned piece of wood.